

CUBIT Capability Proposal

Technical Area

Geometry, Meshing, Infrastructure, GUI, Graphics, etc..

Technical Lead

Cubit Developer in charge of technical area

Meshing/Boundary Conditions

Matt Staten/Karl Merkley

MRD Description

Describe the capability in terms of how a user would see it.

Support interface conditions for non-conforming elements

SRS Description

What needs to be done by Cubit developers to implement this capability? Break the tasks into steps if applicable. (Steps should be on the order of 2 man-weeks or more)

1. For tets and hexes in adjacent volumes, allow tets to share nodes with hexes at the interface.
2. For tets and hexes in adjacent volumes, create pyramid elements at the interface to make them compatible. Pyramids would be stored in a separate block. (See paper from sjowen). Several in-house codes now support pyramid elements.
3. Create a sideset at an interface that represents multi-point constraints. Several commercial codes currently support MPCs
4. Create Wedge bundles to support a non-conforming interface. This requires imprinting the element interfaces on each other. This supports the interface conditions described by Sam Key, Clark Dohrman, Martin Heinsteins, et.al.
5. Create wedge bundles for non-conforming overlapping solid elements. This supports the work by Martin Heinsteins.
6. Create Mortar Elements at non-conforming interfaces. This supports the work from Pavel Bochev

Justification

Describe why this is important and what impact it will have if it is implemented. (or not implemented).

Several technologies are now available at Sandia for interfacing different element types or elements of different resolutions together. In order for these technologies to take hold, better geometry and meshing support is required. All of these technologies may not be required, however it would be useful to evaluate each technology to determine how useful it would be to the Sandia Analysts. Supporting this technology is also a hedge against having to solve the conforming all-hex problem. Acceptance of this technology lessens the need for all-hex meshing of complex assemblies.

Resources

Who will work on this

Time estimate

How much time will it take in man-weeks

Targeted Release

10.2 (August 06), 10.3 (March 2007), 10.4 (August 2007), Future (beyond FY07)

Mike Borden
Mike Brewer
Mike Stephenson

Varies based on how much we decide to take on

future

Submitted By:

Steve Owen

Date:

4/5/06